

CHANGES TO THE SPECIFICATION:

The specification has been reviewed in response to this Office Action. Changes have been made to the specification only to place it in preferred and better U.S. form for issuance and to resolve the Examiner's objections raised in the Office Action. No new matter has been added.

REJECTION UNDER 35 U.S.C. § 102:

In the Office Action, at page 2, claim 23 was rejected under 35 U.S.C. § 102 in view of U.S. Patent No. 6,253,004 to Lee et al. ("Lee"). This rejection is traversed and reconsideration is requested.

Amended independent claim 23 recites, "a micro-lens built-in vertical cavity surface emitting laser (VCSEL), comprising: a micro-lens integrally formed on a laser beam emitting surface of the VCSEL emitting a parallel light beam and disposed in a window region through which the light beam is emitted; a lens layer comprising the micro-lens and formed on the laser beam emitting surface of the VCSEL; and an upper electrode formed on a portion of the lens layer excluding the window region."

Lee generally describes a microlens 103 focusing diffracted beams or collimating them to make parallel light beams B. See column 2, lines 63-67, and column 3, lines 1-11. The microlens 103 of FIG. 1 is integrated together with a VCSEL 101 onto a substrate 102 by a semiconductor fabrication process. The microlens 103 and the substrate 102 are integrated and assembled together with the VCSEL 101, thereby forming a structure like a microlensed VCSEL 106 of FIG. 1. However, Lee fails to teach or suggest that the microlens 103 is "disposed in a window region through which the light beam is emitted," as recited in independent claim 23. Furthermore, Lee is silent as to providing "a lens layer comprising the micro-lens and formed on the laser beam emitting surface of the VCSEL; and an upper electrode formed on a portion of the lens layer excluding the window region," as recited in amended independent claim 23. Accordingly, it is respectfully requested that independent claim 23 and related dependent claims be allowed.

REJECTION UNDER 35 U.S.C. § 103:

In the Office Action, at page 3, claims 1-3 5-9, 11-14, and 16-22 were rejected under 35 U.S.C. § 103 in view of prior art and U.S. Patent No. 5,084,895 to Shimada et al. (Shimada). The reasons for the rejection are set forth in the Office Action and therefore not repeated. The rejection is traversed and reconsideration is requested.

According to page 3 of the Office Action, first paragraph, the admitted prior art describes “a micro-lens disposed in a window region through which the laser beam is emitted,” as recited in independent claim 1; however, upon review of the prior art presented in the background of the above-referenced application, paragraph [0007] explains “a condensing lens for condensing a divergent laser beam emitted from the VCSEL is required between the VCSEL and an input terminal of the optical cable, so as to efficiently couple the laser beam emitted from the VCSEL to the optical cable.” Further, paragraph [0008] of the specification explains, “...the optical head needs a collimating lens for condensing a divergent laser beam emitted from the conventional VCSEL into a parallel laser beam,” and paragraph [0009] describes “a separate condensing lens or collimating lens is needed at the light emitting side of the VCSEL so as to construct an optical system with the VCSEL.”

Contrary to the assertions made in the Office Action, there is no teaching or suggestion in the admitted prior art of “a **micro-lens disposed in a window region** through which the laser beam is emitted” and “a lens layer formed on the upper reflector with a transparent material transmitting a laser beam, **the lens layer comprising the micro-lens,**” emphasis added, as recited in independent claim 1. Neither the condensing lens nor the collimating lens of the admitted prior art are disposed in a window region through which the laser beam is emitted and neither the condensing lens nor the collimating lens are included in a lens layer.

According to Shimada, a conventional semiconductor laser 1 deposited on a common semiconductor substrate 11 with a microlens 2. See column 2, lines 44-47 of Shimada. The microlens 2 is made of a layer 30, which is transparent to the laser light. See column 3, lines 29-30 of Shimada. However, Shimada fails to teach or suggest that the layer 30 is “formed **on the upper reflector** with a transparent material transmitting a laser beam,” emphasis added, as recited in independent claim 1. Rather, the layer 30 is formed **on the microlens 2**. (Emphasis added) The layer 30 itself is transparent to the laser light. Further, rather than providing that “the lens layer comprises the micro-lens,” as recited in independent claim 1, Shimada provides that the microlens 2 is the layer 30, rather than a component of the lens layer as in the present invention.

Referring to independent claim 6, because the claimed features of independent claim 1 are somewhat related to the claimed features recited in independent claim 6, the arguments presented above supporting the patentability of independent claim 1 are incorporated herein to support the patentability of independent claim 6. Furthermore, on page 5 of the Office Action, it

is correctly recognized that the admitted prior art and Shimada fail to teach or suggest “wherein the window region comprises a maximum width smaller than a size of light generated in the active layer emitted towards the window region, satisfying a Fraunhofer diffraction condition, where the Fraunhofer diffraction condition occurring in the window region is offset by a focusing power of the micro-lens,” as recited in independent claim 6. However, the Office Action, concludes, without adequate support that “since the combined structure of admitted prior art and Shimada is identical to the claimed device the combined structure satisfies the Fraunhofer diffraction condition as claimed.” Neither the admitted prior art nor Shimada teaches or suggests window region satisfying a Fraunhofer diffraction condition to, among other advantages, provide a VCSEL emitting a parallel laser beam, without including a separate condensing or a collimating lens. In other words, even if the combination of the prior art of record is made, one would still not have the presently claimed invention without making yet further modifications to the suggested combination.

Rejection of patent application for obviousness under 35 U.S.C. §103 must be based on evidence comprehended by language of that section, and search for and analysis of prior art includes evidence relevant to finding of whether there is teaching, motivation, or suggestion to select and combine references relied on as evidence of obviousness. See In re Lee, 61 USPQ2d 1430 (CA FC 2002). Accordingly, it is respectfully requested that either evidence is presented showing a teaching or suggestion of the claimed features of the window region as recited in independent claim 6 or that the rejection be withdrawn.

Referring to independent claim 12, because the claimed features of independent claim 1 are somewhat related to the claimed features recited in independent claim 12, the arguments presented above supporting the patentability of independent claim 1 are incorporated herein to support the patentability of independent claim 12. Independent claim 17 recites, “a micro-lens disposed in a window region through which a laser beam is emitted . . . wherein the window region comprises a maximum width smaller than a size of the light generated in the active layer and emitted towards the window region, satisfying a Fraunhofer diffraction condition, where the Fraunhofer diffraction condition occurring in the window region is offset by a focusing power of the micro-lens.” Because the claimed features of independent claims 1 and 6 are somewhat related to the claimed features recited in independent claim 17, the arguments presented above supporting the patentability of independent claims 1 and 6 are incorporated herein to support the patentability of independent claim 17.

Referring to independent claim 23, as previously set forth, Lee fails to teach or suggest that the microlens 103 is “disposed in a window region through which the light beam is emitted,” as recited in independent claim 23. Furthermore, Lee is silent as to providing “a lens layer comprising the micro-lens and formed on the laser beam emitting surface of the VCSEL; and an upper electrode formed on a portion of the lens layer excluding the window region,” as recited in amended independent claim 23. Further, because the claimed features of independent claim 1 are somewhat related to the claimed features recited in independent claim 23, the arguments presented above supporting the patentability of independent claim 1 are incorporated herein to support the patentability of independent claim 23.

In the Office Action, it appears that the standard for an obviousness rejection is overlooked by simply concluding, without adequate support from the admitted prior art and/or Shimada, that a micro-lens including the “lens layer formed on the upper reflector with a transparent material transmitting a laser beam, the lens layer comprising the micro-lens” is well known in the art. Further, the Office Action conclusively rejects the claims based on “rearrangement of the claimed features” and disregarding all features recited in the claims. Rather than using the teachings of the cited references, attention is diverted to a case law without any relationship to the proposed combination of the cited references and disregarding the current laws regarding the standard of an obviousness rejection under 35 U.S.C. § 103(a). Rather than using the teachings of the cited references, it is simply concluding that it would have been obvious to combine the admitted prior art and Shimada “since the modification can make finding the optical axis of the laser and the lens easier,” without indicating where in the cited prior art a need to easily find the optical axis of the laser and the lens.

It is improper to merely deem something obvious without any teaching/suggestion, or the taking of Judicial Notice. If the U.S. Patent and Trademark Office wishes to take Judicial Notice that the proposed structural and functional modification is notoriously well known, it is respectfully requested that supporting evidence be provided. The Federal Circuit has cautioned that an Examiner must show reasons that the skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would select the elements from the cited prior art references for combination in the manner claimed. In re Rouffet, 47 USPQ2d 1453, 1458 (Fed. Cir. 1998).

No such showing has been made in the present Office Action. It is submitted that the reason why no such showing was made is because the prior art of record individually or

combined, fail to teach, suggest, or otherwise provide the motivation needed to make such a modification. "To support the conclusion that the claimed combination is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed combination. It is to be noted that simplicity and hindsight are not proper criteria for resolving the issue of obviousness." Ex Parte Clapp, 227 USPQ 972, 973 (B.P.A.I. 1985). In view of the foregoing, it is respectfully asserted that the prior art of record, individually or combined, fail to teach or suggest all the claimed features recited in independent claim 1.

Because the independent claims have been rejected in view of the admitted prior art of record, Shimada, and Lee and because, as previously set forth, the prior art of record, individually or combined, fails to teach or suggest the claimed features of independent claims 1, 6, 12, 17, and 23, it is respectfully asserted that the dependent claims corresponding independent claims 1, 6, 12, 17, and 23 are patentable in view of the prior art of record. Accordingly, it is respectfully requested that independent claims 1, 6, 12, 17, and 23 and related dependent claims be allowed.

CONCLUSION:

In accordance with the foregoing, it is respectfully submitted that all outstanding objections and rejections have been overcome and/or rendered moot, and further, that all pending claims patentably distinguish over the prior art. Thus, there being no further outstanding objections or rejections, the application is submitted as being in condition for allowance, which action is earnestly solicited.


If the Examiner has any remaining issues to be addressed, it is believed that prosecution can be expedited by the Examiner contacting the undersigned attorney for a telephone interview to discuss resolution of such issues.

If there are any underpayments or overpayments of fees associated with the filing of this Amendment, please charge and/or credit the same to our Deposit Account No. 19-3935.

Respectfully submitted,

STAAS & HALSEY LLP

Date: 10/16/02

By: 
Alicia M. Choi
Registration No. 46,621

700 Eleventh Street, NW, Suite 500
Washington, D.C. 20001
(202) 434-1500

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

Please AMEND paragraph [0040], as follows:

[0040] Referring to FIG. 5, the micro-lens built-in VCSEL, according to the second embodiment of the present invention, includes a substrate 200, a lower reflector 210, an active layer 120, and an upper reflector 240 which are sequentially stacked on the substrate 200, an upper electrode [250] 260 formed on the upper reflector 240, and a lower electrode 270 formed on a portion of the bottom of the substrate 200 excluding a window region 280 through which a laser beam is emitted. To emit a laser beam through the substrate 200, the lower reflector 210 is formed having a smaller reflectivity than the upper reflector 240.

IN THE CLAIMS:

Please AMEND claims 23, 24, and 54:

23. (ONCE AMENDED) A micro-lens built-in vertical cavity surface emitting laser (VCSEL), comprising:

a micro-lens integrally formed on a laser beam emitting surface of the VCSEL emitting a parallel light beam and disposed in a window region through which the light beam is emitted;

a lens layer comprising the micro-lens and formed on the laser beam emitting surface of the VCSEL; and

an upper electrode formed on a portion of the lens layer excluding the window region.

24. (ONCE AMENDED) The micro-lens built-in VCSEL as recited in claim 23, further comprising:

a substrate;

a lower electrode formed underneath the substrate;

a lower reflector;

an active layer comprising a light generating region; and

an upper reflector comprising a relatively lower reflectivity than that of the lower reflector;

a lens layer formed on the upper reflector, wherein the micro-lens is formed in a window region of the lens layer through which the light beam is condensed and emitted; and

an upper electrode formed on a portion of the lens layer excluding the window region],

wherein the window region is defined by the upper electrode and the micro-lens.

54. (ONCE AMENDED) The micro-lens built-in VCSEL as recited in claim 23, further comprising:

- a substrate;
- a lower electrode formed underneath the substrate;
- a lower reflector;
- an active layer comprising a light generating region; and
- an upper reflector comprising a relatively lower reflectivity than that of the lower reflector[;
- a lens layer formed on the upper reflector, wherein the micro-lens is formed in a window region of the lens layer through which the light beam is condensed and emitted; and
- an upper electrode formed on a portion of the lens layer excluding the window region],

wherein the window region comprises a diameter satisfying a Fraunhofer diffraction condition and is defined by the upper electrode and the micro-lens.